



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,725	08/25/2003	Jongyoon Han	1153.034US2	4705
35437 7590 07/05/2007 MINTZ LEVIN COHN FERRIS GLOVSKY & POPEO 666 THIRD AVENUE NEW YORK, NY 10017			EXAMINER OLSEN, KAJ K	
			ART UNIT 1753	PAPER NUMBER
			MAIL DATE 07/05/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/648,725	HAN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Kaj K. Olsen	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 17 May 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 24-55 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 24-55 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date: _____   | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Double Patenting*

1. The outstanding double patenting rejection against the claimed invention has been withdrawn in view of the filed terminal disclaimer, which has been approved.

### *Claim Objections*

2. Claim 28 is objected to because of the following informalities: Claim 28 misspells --nanofluidic--. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 24-41 and 44-55 are rejected under 35 U.S.C. 102(e) as being anticipated by Austin et al (USP 5,837,115).
5. Austin discloses a device comprising a plurality of alternating constricted regions 54 and unconstricted regions (i.e. the space between obstacles 39) that form a channel M. The unconstricted regions have a transverse dimension that extends the entire width of the sensing device (see fig. 6), whereas the constricted regions have a transverse dimension  $S_d$  that can be

Art Unit: 1753

down to as low as 10 nm and as high as 1000 nm. See col. 10, l. 66 through col. 11, l. 3. This dimension overlaps the disclosed constriction range of the instant invention (see p. 5, ll. 2-6) and would thereby meet the claimed constricted region. With respect to whether the unconstricted regions allow a larger molecule to approach its equilibrium shape and whether the constricted regions are sufficiently small to influence the shape of some of the molecules moving through the channels, both of these limitations merely recite the intended use of the device and depend entirely on the composition of the unclaimed molecules being placed within the device. Note that the claim preamble states that the device is "for separating molecules" and the molecules are clearly not part of the claimed invention. Absent a particularly claimed molecule with particularly claimed dimensions, it is unclear how these limitations further define the device itself. Moreover, even if the examiner were to give the intended use of the unclaimed molecules further due consideration, the examiner believes Austin would still meet these limitations. In particular, Austin teaches the utility of the device for large molecules such as DNA, proteins, and polymers (col. 4, ll. 34-44) and teaches that the constricted regions force the DNA molecules to stretch and release themselves around the various obstacles. See col. 13, ll. 42-55. Stretching and releasing itself clearly indicates that the dimension  $S_d$  is influencing the shape of some of the molecules. Furthermore, the unconstricted regions have a dimension large enough (i.e. the entire width of the device) to allow a DNA molecule to approach its equilibrium shape.

6. With respect to the various limitations concerning the behavior of the molecules (including the molecules being entropically hindered), the molecules are not being claimed and these limitations do not further limit the device itself, but only set forth how applicant intends to

Art Unit: 1753

utilize the device. The constricted dimensions utilized by Austin (col. 10, l. 66 through col. 11, l.

3) clearly overlap the dimensions utilized by the instant invention.

7. With respect to a means for applying a force to the molecules, see col. 13, ll. 32-36.

8. With respect to the presence of a loading chamber, see col. 13, ll. 26-29.

9. With respect to the presence of a loading channel, either space 32 or spaces 137 and 138 would read on the defined loading channel with spaces 137 and 138 or space 32 respectively reading on the defined loading chamber. Both spaces 137 or 138 and space 32 are separated by pillars 39 that would function as entropic barriers. See fig. 9 and the discussion of  $S_d$  above.

10. With respect to the means for creating a series of entropic barriers, the  $S_d$  dimensions disclosed by Austin overlap the dimensions utilized by the instant invention to affect an entropic barrier.

### ***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Austin in view of Wilding et al (USP 5,304,487).

13. Austin does not disclose using an optical microscope as a detector, but does disclose using a transparent cover for viewing the molecules (col. 6, ll. 1-3). Wilding discloses a separating device comprising means for optical detection through a transparent cover (col. 8, ll.

Art Unit: 1753

1-7) by using a microscope (col. 9, ll. 49-53). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device disclosed by Austin by using a microscope for optical detection as disclosed by Wilding because it useful in detecting different types of molecules more closely and a transparent cover would allow observation by use of a microscope.

### ***Response to Arguments***

14. Applicant's arguments filed 5-17-2007 have been fully considered but they are not persuasive. This examiner initially notes that the rejections relying on Austin have been substantially rewritten from the previous examiner's office action and some of the issues addressed in the arguments (e.g. the discussion of fig. 16 and 17) are no longer relevant.

15. Applicant urges that Austin does not include any discussion of constricted regions being sufficiently small to influence shape of molecules. First, as discussed in the body of the rejection above, this is incorrect as Austin does discuss how the constrictions change the shape of the molecules. See col. 13, ll. 42-55. Second, influencing the shape of the molecule is the applicant's intended for the instant invention. As the examiner pointed out above, Austin taught the use of the device with DNA molecules and taught the use of dimensions for the constricted regions that substantially overlap the dimensions utilized by the instant invention. Compare col. 10, l. 66 through col. 11, l. 3 of Austin with p. 5, ll. 2-6 of the instant invention. Hence, even if Austin didn't disclose the use of the constricted region for influencing the shape of molecules, the dimensions explicitly disclosed by Austin still would have been capable of influencing the shape of molecules.

Art Unit: 1753

16. Applicant also urges that Austin is drawn to the use of a tortuous path to accomplish its separation. Albeit correct, nothing in the claimed instant invention reads away from the use of the constricted and unconstricted regions in the form of a tortuous path.

17. Applicant urges that the dimensions of col. 11, ll. 5-9 would not be expected to influence the shape of molecules as required by claims 24, 51, and 53. First, whether or not the  $S_d$  of col. 11, ll. 5-9 would alter the shape of molecules entirely depends on the molecules in question. Again the molecules themselves are not being claimed. Second, applicant's cited passage ignores earlier in the same paragraph where Austin disclosed the use of dimensions that would clearly read on the unspecified dimensions of the claims because they substantially overlap the dimensions disclosed by the instant invention. Again, compare col. 10, l. 66 through col. 11, l. 3 with p. 5, ll. 2-6 of the instant invention.

18. Applicant's arguments concerning the 103 rejection appear to rely on applicant's perceived failings of the earlier 102 rejection. Because these earlier arguments were not persuasive as discussed above, these arguments against the 103 rejection are similarly unpersuasive.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Friday from 8:00 A.M. to 4:30 P.M..

Art Unit: 1753

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753  
June 29, 2007



**KAJ K. OLSEN**  
**PRIMARY EXAMINER**